



Air Quality Permitting Statement of Basis

February 6, 2006

Permit to Construct No. P-050041

**St. Luke's Meridian Medical Center
Meridian, Idaho**

Facility ID No. 001-00182

Prepared by:

HE

**Harbi Elshafei, AQ Permitting Analyst 3
AIR QUALITY DIVISION**

FINAL

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Acronyms, Units, and Chemical Nomenclature

AFS	AIRS Facility Subsystem
AIRS	Aerometric Information Retrieval System
AQCR	Air Quality Control Region
ASTM	American Society for Testing and Materials
CO	carbon monoxide
DEQ	Department of Environmental Quality
EF	emission factor
Btu	British thermal units
Btu/gal	Btu's per gallon
HAPs	hazardous air pollutants
IDAPA	a numbering designation for all administrative rules in Idaho promulgated in accordance with the Idaho Administrative Procedures Act
lb/hr	pound per hour
MMBtu	million British thermal units
NAAQS	National Ambient Air Quality Standards
NESHAP	National Emission Standards for Hazardous Air Pollutants
NO _x	oxides of nitrogen
NSPS	New Source Performance Standards
O ₃	ozone
Pb	lead
PM	particulate matter
PM ₁₀	particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
PSD	Prevention of Significant Deterioration
PTC	permit to construct
PTE	potential to emit
Rules	Rules for the Control of Air Pollution in Idaho
SLMMC	Saint Luke's Meridian Medical Center
SIC	Standard Industrial Classification
SIP	State Implementation Plan
SO ₂	sulfur dioxide
TAPs	toxic air pollutants
T/yr	tons per year
UTM	Universal Transverse Mercator

1. PURPOSE

The purpose for this memorandum is to satisfy the requirements of IDAPA 58.01.01.200, Rules for the Control of Air Pollution in Idaho, for issuing permits to construct.

2. FACILITY DESCRIPTION

Saint Luke's Meridian Medical Center (SLMMC) is a general medical and surgical hospital located at 520 S. Eagle Rd. in Meridian, Idaho. The existing emissions sources at SLMMC are two dual-fuel boilers and two diesel-fired emergency generators.

3. FACILITY / AREA CLASSIFICATION

The SLMMC is not a major facility as defined in IDAPA 58.01.01.205, nor is it a designated facility as defined in IDAPA 58.01.01.006.27. The primary Standard Industrial Classification (SIC) code for the facility is 8062, *General Medical and Surgical Hospitals*. The Aerometric Information Retrieval System (AIRS) facility classification is *synthetic minor* (SM)—potential uncontrolled oxides of nitrogen and sulfur dioxide emissions are greater than 100 tons per year (T/yr), but permitted emissions are less than 100 T/yr. The potential emissions rates for hazardous air pollutants (HAPs) are below 25 T/yr collectively and less than 10 T/yr for any single HAP. The facility is not subject to Prevention of Significant Deterioration (PSD) requirements because its potential to emit is less than all applicable PSD major source thresholds.

The SLMMC is located in the city of Meridian, which is located in Northern Ada County. Northern Ada County is located in Air Quality Control Region (AQCR) 64 and Universal Transverse Mercator (UTM) Zone 11. Northern Ada County is an attainment area for carbon monoxide (CO) and particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers (PM₁₀), and unclassifiable for sulfur dioxide (SO₂), oxides of nitrogen (NO_x), ozone (O₃), and lead (Pb). There are no Class I areas within 10 kilometers of the facility.

The AIRS information for each regulated air pollutant emitted by SLMMC is provided in Section 8 of this document. This information is entered into the U.S. Environmental Protection Agency (EPA) AIRS database.

4. APPLICATION SCOPE

On August 10, 2005, the Department of Environmental Quality (DEQ) received an application from SLMMC, requesting to modify the facility's permit to construct (PTC) No. 001-00182, issued on November 21, 2001. The requested modification is to increase the permitted sulfur content limit from 0.05% to 0.5% by weight when combusting ASTM Grade 2 fuel oil in the boilers and the generators. The facility did not request to change any existing permit conditions pertaining to fuel oil throughput limits to the boilers or to the generators. The facility is also requesting to delete permit condition 2.10 existing in the facility's permit. Permit condition 2.10 states that "The permittee shall apply for a facility-wide Tier II operating permit within one year of the issuance of this permit to construct."

4.1 Application Chronology

8/10/05	DEQ received an application from SLMMC to revise the facility's existing permit to construct No. 001-00182, issued on November 21, 2001.
10/19/05	DEQ determined SLMMC's permit application complete.
1/17/06	DEQ sent an electronic copy of the draft permit to the Boise Regional Office for review.
1/13/06	DEQ sent SLMMC an electronic copy of draft permit No. P-050041 for review.
1/27/06	SLMMC submitted comments on the draft permit.

5. PERMIT ANALYSIS

This section of the Statement of Basis describes the regulatory requirements for this PTC action.

5.1 Equipment Listing

The equipment at this facility is not changed by this permit revision.

5.2 Emissions Estimates

Emissions estimates were provided by SLMMC's consultant (CH2M HILL) and are included in the permit application materials that were submitted to DEQ on 8/10/05. Appendix A of this statement of basis contains the estimated increase in the boilers' and the generators' emissions for the SO₂. The boilers' emissions estimates for the SO₂ were based on emissions factors described in the U.S. EPA's *Compilation of Air Pollution Emission Factors*, AP-42, Fifth Edition, Section 1.3, Fuel Oil Combustion (9/98). The SO₂ emissions estimates submitted by CH2M HILL were based on emission factor of 78.5 lb/10³ gallons of fuel oil used for the boiler greater than 100 MMBtu/hr. However, the correct emission factor should have been 71 lb/103 gallons of fuel used for boiler less than 100 MMBtu/hr. SLMMC requested a conservative SO₂ emissions estimate, which were used to support the modeling effort. Therefore, DEQ did not change the SO₂ emissions because the SO₂ emissions were requested by the facility- please see email from CH2M HILL to Harbi Elshafei dated January 30, 2006 and it is attached in Appendix A of this statement of basis.

The generators' emissions estimates for SO₂ were based on emissions factors described in the U.S. EPA's *Compilation of Air Pollution Emission Factors*, AP-42, Fifth Edition, Section 3.4, Large Stationary Diesel and All Stationary Dual-Fuel Engines (10/96). SLMMC requested to increase the sulfur content in the fuel oil from 0.05% to 0.5% by weight. Emissions of particulate matter with an aerodynamic diameter less than or equal to a nominal ten micrometers (PM₁₀), carbon monoxide (CO), oxides of nitrogen (NO_x), volatile organic compound (VOC), and toxic air pollutants (TAPs) are not expected to increase as a result of increasing the sulfur content in the ASTM Grade 2 fuel oil. As a result, only the increase in SO₂ emissions was included in the modeling analysis.

The estimated emissions for the SO₂ from the boilers and the generators are summarized in Table 5.1. Emissions of PM₁₀, CO, and NO_x are included in Table 5.1 for emission inventory purposes and are the same as existed in PTC No. 001-00182, issued on November 21, 2001. The VOC emissions are obtained from the technical memorandum for the PTC No. 001-00182, issued on November 21, 2001. The SO₂ emissions estimates presented in Table 5.1 provided the basis of the analysis of this pollutant compliance with the National Ambient Air Quality Standards (NAAQS) – see the modeling results in Appendix B of this document.

Table 5.1 Table 5.1 EMISSIONS RATES FROM THE BOILERS AND GENERATORS

Source Description	PM ₁₀ ^a		CO ^b		NO _x ^c		SO ₂ ^d		VOC ^e	
	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr
Two boiler stacks ^f	0.35	0.67	0.96	4.20	2.10	6.00	8.25	8.68	0.06	0.26
Emergency generator No. 1 stack	0.99	0.25	8.38	3.23	30.49	7.62	5.68	2.19	1.65	0.41
Emergency generator No. 2 stack	0.53	0.13	6.77	1.69	16.01	4.00	4.98	1.16	0.87	0.22
Total	1.87	1.05	16.11	9.12	48.60	17.62	18.91	12.03	2.58	0.89

^a Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers

^b Carbon monoxide

^c Oxides of nitrogen

^d Sulfur dioxide

^e Volatile organic compound

^f Emissions are from one boiler. Only one boiler shall operate at any time while combusting ASTM Grade 2 fuel oil

It should be noted that, as shown in Table 5.1, the total increase in SO₂ emissions that resulted from the requested increase in the sulfur content limit from 0.05% to 0.5% by weight when combusting ASTM Grade 2 fuel oil in the boilers and the generators did not trigger the major source threshold limits of 100 T/yr. Thus, emissions from SLMMC are below the permitting requirements that are mandated under the Title V permitting program.

Detailed emissions estimates are included in Appendix A of this statement of basis. It should be noted that the SO₂ emissions from the boilers and the generators were increased by 10.84 T/yr as a result of increasing the sulfur content in the fuel oil from 0.05% to 0.5% by weight. The increase in the SO₂ emissions were used to determine the processing fee assessed in accordance with IDAPA 58.01.01.226.

5.3 Modeling

The permittee supplied the SO₂ National Ambient Air Quality Standards (NAAQS) ambient impact demonstration in support of the PTC application. The DEQ's modeling memorandum concerning the review of the ambient impact demonstration is included in Appendix B of this statement of basis. The results show that SLMMC has demonstrated compliance with SO₂ NAAQS to the satisfaction of DEQ. The PM₁₀, CO, NO_x, and TAP emissions were not modeled because this project did not result in increase in any of these pollutants emissions.

5.4 Regulatory Review

This section describes the regulatory analysis of the applicable air quality rules with respect to this PTC.

IDAPA 58.01.01.201 Permit to Construct Required

A revision to the PTC was requested by SLMMC in accordance with IDAPA 58.01.01.201

IDAPA 58.01.01.203 Permit Requirements for New and Modified Stationary Sources

Ambient air quality modeling has predicted the facility will not violate the SO₂ NAAQS. All other regulated air pollutants including the TAPs emissions are not expected to increase as a result of increasing the sulfur content in the ASTM Grade 2 fuel oil; therefore, only the SO₂ emissions were required to be modeled for this project.

IDAPA 58.01.01.212.01 Obligation to Comply

Receipt of this revised PTC does not relieve SLMMC from the responsibility to comply with all applicable local, state, and federal statutes rules and regulations.

IDAPA 58.01.01.224-225 Permit to Construct Application and Processing Fees

SLMMC paid the \$ 1,000 application fee in accordance with IDAPA 58.01.01.224. This project is also subject to the processing fee provisions of IDAPA 58.01.01.225, and SLMMC was assessed a processing fee of \$5,000.00 for an increase in SO₂ emissions of 10.84 tons per year.

5.5 Permit Conditions Review

This section lists only those permit conditions that have changed or have been deleted as a result of this permit modification. All other permit conditions remain unchanged. Permit conditions related to the modified permit are identified as Modified Permit Conditions. Permit conditions related to the existing permit are identified as Existing Permit Conditions.

Existing Permit Conditions 2.3 and 2.7 limit the sulfur content in the ASTM Grade 2 fuel oil that is combusted in the boilers and generators to 0.05% sulfur by weight.

Modified Permit Conditions 2.12 and 3.7 limit the sulfur content in the ASTM Grade 2 fuel oil that is combusted in the boilers and the generators to 0.5% sulfur by weight.

Existing Permit Conditions 2.8, 3.4, and 3.6 required the permittee to develop an O&M manual for the operations of the boilers and the generators. These permit conditions were deleted in the modified PTC. DEQ includes an O&M manual in the permit for the emissions control equipment. The boilers and the emergency generators have no control equipment and thus the O&M manual are not required for the modified PTC.

Existing Permit Condition 1.1 – Particulate Matter Grain Loading Emissions Limits from the emergency generators. This permit condition was deleted from the PTC because the PM grain loading limits don't apply to the generators. Generators are considered internal combustion engines and the fuel burning equipment of IDAPA 58.01.01.675 does not apply to the internal combustion engines.

Existing Permit Conditions 2.10 requires the permittee to apply for a facility-wide Tier II operating permit within one year of the issuance of the existing PTC. The permittee requested to delete this permit condition because the SLMMC stated that they are complying with IDAPA 58.01.01.200; and SLMMC will be expanding the hospital in the future and anticipates that a PTC modification will be triggered. Emissions from the existing PTC were modeled by using Screen3 model and found to meet NAAQS. The requirement in the existing PTC to obtain a Tier II OP was arbitrary and was not justified by the air regulations. Therefore, this permit condition was removed from the existing PTC.

Modified Permit Condition 2.17 requires that the permittee monitor and record the fuel sulfur content in the ASTM Grade 2 fuel oil delivered to the facility on an as-received-basis to demonstrate compliance with Permit Conditions 2.12 and 3.7.

PTC General Provisions, the most recent version of the PTC General Provisions was used. In particular, note that the maximum allowable operating rate(s) is no longer limited to 20% of the operating rate during any performance test.

6. PERMIT FEES

St. Luke's Meridian Medical Center paid the PTC application fee on September 15, 2005. In accordance with IDAPA 58.01.01.225 and .226 a PTC processing fee of \$5,000.00 is required because the increase of emissions is 10 to less than 100 tons per year. The processing fee was paid on January 4, 2006.

Table 8.1 PTC PROCESSING FEE TABLE

Emissions Inventory			
Pollutant	Annual Emissions Increase (T/yr)	Annual Emissions Reduction (T/yr)	Annual Emissions Change (T/yr)
NO _x	0.0	0	0.0
SO ₂	10.84	0	10.84
CO	0.0	0	0.0
PM ₁₀	0.0	0	0.0
VOC	0.0	0	0.0
TAPS/HAPS	0.0	0	0.0
Total:	10.84	0	10.84
Fee Due	\$5,000.00		

7. PERMIT REVIEW

7.1 Regional Review of Draft Permit

DEQ's Boise Regional Office was provided the draft permit for review on January 17, 2006. The Boise Regional Office had no comments.

7.2 Facility Review of Draft Permit

The facility was provided the draft permit for review on January 13, 2006. The facility's comments were incorporated into the permit.

7.3 Public Comment

An opportunity for public comment period on the PTC application was provided in accordance with IDAPA 58.01.01.209.01.c. from November 1, 2005 through November 30, 2005. During this time, there were no comments on the application and no requests for public comment period on DEQ's proposed action.

8. AIRS INFORMATION

Table 8.1 AIRS/AFS^a FACILITY-WIDE CLASSIFICATION^b DATA ENTRY FORM

AIR PROGRAM	SIP	PSD	NSPS (Part 60)	NESHAP (Part 61)	MACT (Part 63)	TITLE V	AREA CLASSIFICATION A – Attainment U – Unclassifiable N – Nonattainment
POLLUTANT							
SO ₂	SM						U
NO _x	SM						U
CO	B						U
PM ₁₀	B						U
PT (Particulate)	B						U
VOC	B						U
THAP (Total HAPs)	B						U
			APPLICABLE SUBPART				
			Dc				

^a Aerometric Information Retrieval System (AIRS) Facility Subsystem (AFS)

^b AIRS/AFS Classification Codes:

- A = Actual or potential emissions of a pollutant are above the applicable major source threshold. For NESHAP only, class "A" is applied to each pollutant which is below the 10 ton-per-year (T/yr) threshold, but which contributes to a plant total in excess of 25 T/yr of all NESHAP pollutants.
- SM = Potential emissions fall below applicable major source thresholds if and only if the source complies with federally enforceable regulations or limitations.
- B = Actual and potential emissions below all applicable major source thresholds.
- C = Class is unknown.
- ND = Major source thresholds are not defined (e.g., radionuclides).

9. RECOMMENDATION

Based on review of application materials, and all applicable state and federal rules and regulations, staff recommends that SLMMC be issued final PTC No. P-050041 for the Meridian hospital. An opportunity for public comment on the air quality aspects of the proposed permit to construct was provided in accordance with IDAPA 58.01.01.209.01.c. No public comment period is recommended, no entity has requested a comment period, and the project does not involve PSD requirements.

HE/bf Permit No. P-050041

Appendix A

St. Luke's Meridian Medical Center

P-050041

Emissions Estimates

St. Luke's Meridian Medical Center; PTC 001-00182

Stationary Source SO₂ Emissions Delta

Source	Revised Estimates		Current PTC Limits		Delta (Increase)	
	SO ₂ lb/hr	SO ₂ ton/yr	SO ₂ lb/hr	SO ₂ ton/yr	SO ₂ lb/hr	SO ₂ ton/yr
Physical Plant Boilers	8.25	8.68	0.75	0.82	7.50	7.86
Diesel Generator 1, Physical Plant Building	5.68	2.19	0.95	0.24	4.73	1.95
Diesel Generator 2, Hospital Building	4.98	1.18	0.50	0.13	4.48	1.03

These are the
submitted increases
in SO₂ emissions
the sum of the increase
in SO₂ emissions =
10.84 T/yr

→ SO₂ EF from AP-42, Section 1.3, Table 1.3-1

$$EF = 1425 \Rightarrow 142 \times 0.5\% = 71.0 \text{ lb}/10^3 \text{ gal}$$

$$\text{Emissions} = \frac{71.0 \text{ lb}}{10^3 \text{ gal}} \left| \frac{105 \text{ gal}}{\text{hr}} \right| = 7.46 \text{ lb/hr}$$

$$\frac{7.46 \text{ lb}}{\text{hr}} \left| \frac{2,100 \text{ hrs}}{\text{yr}} \right| \left| \frac{1 \text{ T}}{2,000 \text{ lbs}} \right| = 7.83 \text{ T/yr}$$

Emissions in the PTC application are 8.25 lb/hr and 8.68 T/yr. These emissions are conservative and are used for modeling.

St. Luke's Meridian Medical Center; PTC 001-00182
Physical Plant Boilers SO₂ Potential to Emit

Parameters^a

	Boiler #1	Boiler#2
Boiler		
Type	Hurst	Hurst
Steam (lb/hr)	12,075	12,075
Max fuel oil flow (gal/hr)	105	105
PTC Max yearly fuel oil operation (hrs)	2,100	2,100
Max flow gas (MMBtu/hr)	11.7	11.7
PTC max gas usage per day (scf)	273,792	273,792
PTC max gas usage per year (scf)	99,900,000	99,900,000
Fuel		
Type	No. 2	No. 2
Max wt% S	0.5	0.5
Stack		
Height (ft)	20	20
Flow Rate (acfm)	5,085	5,085
Diameter (ft)	1.7	1.7
Temperature (°F)	450	450
Building		
Height (m)	5.1	
Min Horizontal (m)	13.7	
Max Horizontal (m)	20.1	

SO₂ Emissions

Fuel Oil	EF^b (lb/10³ gal)	PTE				PTE Modeling Averages (g/s)		
		lb/hr	lb/24-hr	lb/yr	ton/yr	Annual	24 hr	3 hr
Boiler #1	78.5	8.24	197.82	17,309	8.7	0.25	1.04	1.04
Boiler #2	78.5	8.24	197.82	17,309	8.7	0.25	1.04	1.04
Natural Gas	(lb/10³ scf)	lb/hr	lb/24-hr	lb/yr	ton/yr	Annual	24 hr	3 hr
Boiler #1	0.6	0.01	0.16	59.94	0.03	0.001	0.001	0.001
Boiler #2	0.6	0.01	0.16	59.94	0.03	0.001	0.001	0.001

Notes

^a Boiler parameters from IDEQ PTC No. 001-00182 Technical Analysis, Nov 2001

^b Sulfur emission factor from EPA AP-42, Section 1.3 Fuel Oil Combustion, Table 1.3-1 and from Section 1.4 Natural Gas Combustion, Table 1.4-2. (Air CHREF 2004)

St. Luke's Meridian Medical Center; PTC 001-00182
Physical Plant Generator SO₂ Potential to Emit

Parameters*

Generator #1	
Type	Caterpillar
KW	1,750
HP	2348
PTC 1hr max fuel consumption (gal)	79.8
PTC 6 hr max fuel consumption (gal)	184.3
PTC 24 hr max fuel consumption (gal)	491.6
PTC yearly max fuel consumption (gal)	61,460
Max Potential to Operate (hrs)	500
Fuel	
Type	No. 2
Btu/gal ^b	141,000
Max wt% S	0.5
Stack	
Height (ft)	20
Flow Rate (acfm)	13,562
Diameter (ft)	1
Temperature (°F)	927
Building	
Height (m)	6.1
Min Horizontal (m)	13.7
Max Horizontal (m)	20.1

SO₂ Emissions

	EF ^b (lb/MMBtu)	PTE					PTE Modeling Averages (g/s)		
		lb/hr	lb/8-hr	lb/24-hr	lb/yr	ton/yr	Annual	24 hr	3 hr
Generator #1	0.505	5.68	13.12	38.00	4,375.55	2.19	0.08	0.18	0.72

Notes

* Generator parameters from IDEQ PTC No. 001-00182 Technical Analysis, Nov 2001

^b Sulfur emission factor from EPA AP-42, Section 3.4 Large Stationary Diesel and All Stationary Dual-fuel Engines, Table 3.4-1, (Air CHIEF 2004)

SO₂ emissions estimator

SO₂ emission factor (EF) is from AP-42, Section 3.4, Table 3.4-1

$$EF = 1.01 S \Rightarrow 1.01 * 0.5 = 0.505 \text{ lb}/10^6 \text{ Btu}$$

$$SO_2 \text{ hourly emissions} = \frac{0.505 \text{ lb}}{10^6 \text{ Btu}} \times \frac{141,000 \text{ Btu}}{\text{gal}} \times \frac{79.8 \text{ gal}}{\text{hr}} = 5.68 \text{ lb/hr} \checkmark$$

$$SO_2 \text{ annual emissions} = \frac{0.505 \text{ lb}}{10^6 \text{ Btu}} \times \frac{141,000 \text{ Btu}}{\text{gal}} \times \frac{61,460 \text{ gal}}{\text{yr}} \times \frac{1 \text{ T}}{2,000} = 2.19 \text{ T/yr} \checkmark$$

St. Luke's Meridian Medical Center; PTC 001-00182
Medical Office Building Generator SO₂ Potential to Emit

Parameters^a

Generator #2	
Type	Detroit
KW	918
HP	1231
PTC max 24 hr fuel consumption (gal)	266
PTC max yearly fuel consumption (gal)	32,560
Max Potential to Operate (hrs)	500
Fuel	
Type	No. 2
Storage	141,000
Max wt% S	0.5
Stack	
Height (ft)	69
Flow Rate (scfm)	8,490
Diameter (ft)	1
Temperature (°F)	700
Building	
Height (m)	32.9
Min Horizontal (m)	76.2
Max Horizontal (m)	141

SO₂ Emissions

	EF ^b		PTE				PTE Modeling Averages (g/s)		
	(lb/hr)	(lb/MMBtu)	lb/hr	lb/24-hr	lb/yr	ton/yr	Annual	24 hr	3 hr
Generator #2	0.004046	0.506	4.98	18.87	2,317.72	1.16	0.03	0.10	0.63

Notes

^a Generator parameters from IDEQ PTC No. 001-00182 Technical Analysis, Nov 2001

^b Sulfur emission factor from EPA AP-42, Section 3.4 Large Stationary Diesel and All Stationary Dual-Fuel Engines, Table 3.4-1, (Air CHREF 2004)

SO₂ emissions estimates

see the previous page for a similar emissions estimates.

Harbi Elshafei

From: Rick.McCormick@CH2M.com
Sent: Monday, January 30, 2006 4:26 PM
To: Harbi Elshafei
Cc: William Rogers
Subject: RE: Draft PTC for St. Luke's Hospital

Harbi,

On behalf of St. Luke's Meridan Hospital, CH2M HILL would like to clarify that a more conservative emission factor was used to estimate the Sulfur Dioxide emissions for the boilers and generators which was supported in the dispersion modeling. The sulfur dioxide emission factor of 78.5 lb/1000 gal was used for a boiler greater than 100 Million Btu/hr. The correct emission factor should have been 71 lb/1000 gal for a boiler less than 100 Million Btu/hr. This results in a conservative estimate that was further supported in our modeling effort.

On behalf of St. Luke's, we request to leave the conservative sulfur dioxide emissions. This change will be noted and amended in a future modification for the Hospital. The purpose for this permit modification was to change the sulfur content in the fuel from 0.05% to 0.5% which is reflected in the Draft permit.

Regards,
Rick McCormick, P.E.
Project Engineer
CH2M HILL - Boise
(208) 345-5314, ext 457

-----Original Message-----

From: Harbi.Elshafei@deq.idaho.gov [mailto:Harbi.Elshafei@deq.idaho.gov]

Sent: Monday, January 30, 2006 3:30 PM
To: McCormick, Rick/BOI
Cc: Harbi.Elshafei@deq.idaho.gov
Subject: Draft PTC for St. Luke's Hospital

Rick,

Here is a draft copy for St. Luke's, Meridian. Please look at Permit Condition 2.13 regarding the NSPS requirements for N.G fuel monitoring. Please send us a copy of the letter that the hospital sent to EPA Region 10 regarding their request to change the fuel monitoring requirements from daily to monthly.

Please provide your comments ASAP.

Thank you, Rick.

Regards,
Harbi Elshafei
Idaho DEQ

Appendix B

St. Luke's Meridian Medical Center

P-050041

Modeling Analysis

MEMORANDUM

DATE: December 8, 2005

TO: Harbi Elshafei, Air Quality Permitting Analyst 3, Stationary Source Air Program

THROUGH: Kevin Schilling, Stationary Source Modeling Coordinator, Stationary Source Air Program *KS*

FROM: Darrin Mehr, Air Quality Analyst, Stationary Source Air Program *DM*

PROJECT NUMBER: P-050041

SUBJECT: Modeling Review for St. Luke's Meridian Medical Center Permit to Construct Modification Application for their facility near Meridian, Idaho.

1.0 SUMMARY

St. Luke's Meridian Medical Center (St. Luke's Meridian), located near Meridian, Idaho, submitted an application for a modification to Permit No. 001-00182 for an increase of distillate fuel sulfur content from 0.5% by weight (wt %) to 0.50 wt % for the two existing dual fuel boilers and the two existing diesel-fired emergency electrical generators. Air quality analyses involving atmospheric dispersion modeling of emissions associated with the facility were submitted in support of a permit application to demonstrate that the facility would not cause or significantly contribute to a violation of any ambient air quality standard (IDAPA 58.01.01.203.02).

A technical review of the submitted air quality analyses was conducted by DEQ. The submitted modeling analyses in combination with DEQ's staff analyses: 1) utilized appropriate methods and models; 2) was conducted using reasonably accurate or conservative model parameters and input data; 3) adhered to established DEQ guidelines for new source review dispersion modeling; 4) showed that predicted pollutant concentrations from emissions associated with the facility, when appropriately combined with background concentrations, were below applicable air quality standards at all receptor locations. Table 1 presents key assumptions and results that should be considered in the development of the permit.

Table 1. KEY ASSUMPTIONS USED IN MODELING ANALYSES	
Criteria/Assumption/Result	Explanation/Consideration
Receptor Spacing. Ambient air is considered to be all areas immediately outside of the building structures. Receptors were placed at 50-meter spacing around the buildings for the fine resolution grid. SO ₂ NAAQS compliance was demonstrated using the 50-meter receptor spacing for the fine grid and property boundary. The location of maximum impact was predicted to be at the first receptor next to the physical plant building (SO ₂ 3/hr avg. for BLR2 GEN1, GEN2).	A receptor spacing of 50 meters was used for the property boundary demarking ambient air. Better resolution of the maximum and design concentrations may have been achieved with a denser receptor grid. This will not be a significant issue for this specific project considering the relatively low ambient impacts for the proposed modification.
St Luke's used the highest 1 st high value for the NAAQS design concentration. This is a conservative approach.	The use of conservative assumptions is adequate and approved for this NAAQS compliance demonstration.

2.0 BACKGROUND INFORMATION

2.1 Applicable Air Quality Impact Limits and Modeling Requirements

This section identifies applicable ambient air quality limits and analyses used to demonstrate compliance.

2.1.1 Area Classification

The St. Luke's Meridian facility is located in Ada County, designated as an attainment or unclassifiable area for sulfur dioxide (SO₂), nitrogen dioxide (NO₂), lead (Pb), and ozone (O₃). St. Luke's is located within the maintenance area for carbon monoxide (CO) and particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers (PM₁₀). There are no Class I areas within 10 kilometers of the facility.

2.1.2 Significant and Full Impact Analyses

If estimated maximum pollutant impacts to ambient air from the emissions sources at the facility exceed the significant contribution levels (SCLs) of IDAPA 58.01.01.006.91, then a full impact analysis is necessary to demonstrate compliance with IDAPA 58.01.01.203.02. A full impact analysis for attainment area pollutants involves adding ambient impacts from facility-wide emissions to DEQ-approved background concentration values that are appropriate for the criteria pollutant/averaging-time at the facility location and the area of significant impact. The resulting maximum pollutant concentrations in ambient air are then compared to the National Ambient Air Quality Standards (NAAQS) listed in Table 2. Table 2 also lists SCLs and specifies the modeled value that must be used for comparison to the NAAQS.

Table 2. APPLICABLE REGULATORY LIMITS				
Pollutant	Averaging Period	Significant Contribution Levels ^a (µg/m ³) ^b	Regulatory Limit ^c (µg/m ³)	Modeled Value Used ^d
PM ₁₀ ^e	Annual	1.0	50 ^f	Maximum 1 st highest ^g
	24-hour	5.0	150 ^h	Maximum 6 th highest ⁱ
Carbon monoxide (CO)	8-hour	500	10,000 ^j	Maximum 2 nd highest ^k
	1-hour	2,000	40,000 ^j	Maximum 2 nd highest ^k
Sulfur Dioxide (SO ₂)	Annual	1.0	80 ^l	Maximum 1 st highest ^g
	24-hour	5	365 ^j	Maximum 2 nd highest ^k
	3-hour	25	1,300 ^j	Maximum 2 nd highest ^k
Nitrogen Dioxide (NO ₂)	Annual	1.0	100 ^l	Maximum 1 st highest ^g
Lead (Pb)	Quarterly	NA	1.5 ^h	Maximum 1 st highest ^g

^a IDAPA 58.01.01.006.91

^b Micrograms per cubic meter

^c IDAPA 58.01.01.577 for criteria pollutants

^d The maximum 1st highest modeled value is always used for significant impact analysis

^e Particulate matter with an aerodynamic diameter less than or equal to a nominal ten micrometers

^f Never expected to be exceeded in any calendar year

^g Concentration at any modeled receptor

^h Never expected to be exceeded more than once in any calendar year

ⁱ Concentration at any modeled receptor when using five years of meteorological data

^j Not to be exceeded more than once per year

2.2 Background Concentrations

Background concentrations were revised for all areas of Idaho by DEQ in March 2003¹. Background concentrations in areas where no monitoring data are available were based on monitoring data from areas with similar population density, meteorology, and emissions sources. Background concentrations used in these analyses are listed in Table 3. Rural/agricultural default values were used for background concentrations. Sulfur dioxide (SO₂) was included in the NAAQS modeling analyses.

Table 3. BACKGROUND CONCENTRATIONS		
Pollutant	Averaging Period	Background Concentration (µg/m ³) ^a
SO ₂	3-hour	120
	24-hour	40
	annual	10

^a Micrograms per cubic meter

3.0 MODELING IMPACT ASSESSMENT

3.1 Modeling Methodology

The only pollutant modeled was SO₂. Emissions of PM₁₀, NO_x, CO, and TAPs are not expected to increase as a result of increasing the sulfur content in the distillate fuel oil used by the facility.

CH2M Hill submitted a revised modeling demonstration on December 7, 2005, by email, on behalf of St. Luke's Meridian. The revised modeling demonstration included a revised BPIP-Prime file reflecting Phase 3 of the main medical building, which has been constructed. Ambient impacts for SO₂ were re-assessed using the new BPIP-Prime information and were lower than those presented in the original modeling demonstration received on August 10, 2005.

Table 4 provides a summary of the modeling parameters used in the DEQ verification analyses.

Table 4. MODELING PARAMETERS		
Parameter	Description/Values	Documentation/Additional Description
Model	ISC3-Prime/BEE-LINE BEEST GUI ^a	ISC3-Prime, version 04269, BEEST Version 9.47
Meteorological data	1987-1991	Boise surface and upper air data, corrected for unrealistically low mixing heights.
Terrain	Not considered	Area was determined to be relatively flat. No differences in receptor elevations were used.
Building downwash	Downwash algorithm	Building dimensions obtained from modeling files submitted. BPIP-Prime was used to establish downwash effects by the applicant and DEQ.
Receptor grid	Grid 1	50-meter spacing along property boundary and out to 250 meters
	Grid 2	100-meter spacing from 250 meters out to 1000 meters

^a Graphic user interface

1 Hardy, Rick and Schilling, Kevin. *Background Concentrations for Use in New Source Review Dispersion Modeling*. Memorandum to Mary Anderson, March 14, 2003.

3.1.1 Modeling Protocol

A protocol was prepared and submitted by CH2M Hill, on behalf of St. Luke's Meridian, to DEQ prior to submission of the application. Written approval of the modeling protocol was not issued by DEQ. Modeling was conducted using methods and data presented in the *State of Idaho Air Quality Modeling Guideline* and the modeling protocol.

3.1.2 Model Selection

ISCST3-Prime was used by CH2M Hill to conduct the ambient air analyses. ISCST3-Prime is the recommended model for this instance. The structures of concern included the main medical facilities building and the physical plant building. The effects of wind-induced downwash of these structures were analyzed with BPIP-Prime and ISC-Prime.

3.1.3 Meteorological Data

Boise surface and upper air meteorological data were used for the St. Luke's Meridian site, which is near Boise. Boise airport is the closest area where model-ready surface meteorological data are available. These data were used in the modeling analyses.

PCRAMMET, the meteorological data preprocessor for ISCST3-Prime, occasionally generates unrealistically low mixing heights as a result of interpolation algorithms used with the twice daily measured mixing heights. DEQ verification modeling was conducted using meteorological data corrected for low mixing heights. All mixing height values below 50 meters were replaced with a value of 50 meters.

3.1.4 Terrain Effects

The modeling analyses submitted by CH2M Hill on behalf of St. Luke's Meridian did not consider elevated terrain. The terrain was considered essentially flat for modeling purposes, and all receptors, emission sources, and ground level building elevations were modeled with base elevations of zero. DEQ did not import receptor elevations using USGS DEM files for the verification analyses.

3.1.5 Facility Layout

DEQ verified proper identification of the facility boundary and buildings on the site by comparing the modeling input to a facility plot plan submitted with the application and aerial photographs of the area. The modeling demonstration included a building structure for Phases 1 and 2 for the main medical building which houses the hospital generator (GEN2) and the physical plant building which houses Boilers 1 and 2 (BLR1 and BLR2) and the physical plant generator (GEN1).

The facility's main medical building was constructed in three phases. The modeling demonstration was revised and resubmitted on December 7, 2005 to reflect Phase 3 of the medical building. BPIP-Prime files account for the entire structure as it exists today.

3.1.6 Building Downwash

Plume downwash effects caused by structures present at the facility were accounted for in the modeling analyses. The Building Profile Input Program (BPIP) Prime algorithm was used by the applicant and DEQ to calculate direction-specific building dimensions and Good Engineering Practice (GEP) stack height information from building dimensions/configurations and emissions release parameters for ISC3-Prime. The Prime algorithm is appropriate for analyzing impacts from this facility because building recirculation cavities extend into ambient air.

3.1.7 Ambient Air Boundary

The ambient air boundary used in the modeling demonstration is all areas exterior to the medical and physical plant buildings because public access is allowed.

3.1.8 Receptor Network

The receptor grids used by St. Luke's Meridian met the minimum recommendations specified in the *State of Idaho Air Quality Modeling Guideline*. DEQ verification analyses were conducted using the same receptor grid.

3.2 Emission Rates

Emissions rates used in the dispersion modeling analyses submitted by the applicant were reviewed against those in the permit application. The following approach was used for DEQ verification modeling:

- All modeled emissions rates were equal to or greater than the facility's emissions calculated in the PTC application or the requested permitted allowable rate.
- The modeling demonstration was conducted using potential hourly SO₂ emissions for the three-hour averaging period; an average hourly SO₂ emission rate based on the requested 24-hour distillate fuel consumption limit for the 24-hour averaging period; and, an average annual SO₂ emission rate based on the requested annual distillate fuel consumption for each emissions unit for the annual averaging period.

Table 5 lists emissions rates for sources included in the dispersion modeling analyses. Daily emissions were modeled by St. Luke's Meridian for 24 hours. Annual emissions were modeled over 8,760 hours per year.

Table 5. MODELED CRITERIA EMISSIONS RATES				
Source ID	Description	SO ₂ ^a Emission Rates		
		lb/hr ^b	lb/day ^c	Tons/yr ^d
GEN1	Generator 1	5.68	35.0	2.2
GEN2	Generator 2	4.98	18.9	1.2
BLR1	Boiler 1	8.24	197.8	8.7
BLR2	Boiler 2	8.24	197.8	8.7

^a Sulfur dioxide
^b Pounds per hour
^c Pounds per day (24-hour period)
^d Tons per year

3.3 Emission Release Parameters

Table 6 provides emissions release parameters, including stack height, stack diameter, exhaust temperature, and exhaust velocity. Values used in the analyses appeared reasonable and within expected ranges. Additional documentation /verification of these parameters were not required.

Table 6. EMISSIONS AND STACK PARAMETERS					
Release Point /Location	Source Type	Stack Height (m) ^a	Modeled Diameter (m)	Stack Gas Temp. (K) ^b	Stack Gas Flow Velocity (m/sec) ^c
GEN1	Point	17.98	0.3	770.4	89.6
GEN2	Point	6.1	0.3	699.3	34.9
BLR1	Point	6.1	0.52	505.4	11.38
BLR2	Point	6.1	0.52	505.4	11.38

^a Meters

^b Kelvin

^c Meters per second

3.4 Results for Full Impact Analyses

St. Luke's Meridian did not present a preliminary impact analysis. The modeling demonstration utilized requested potential emissions for all four existing emissions units. Ambient impacts for the 24-hour and annual averaging periods accounted for SO₂ emission rates that were below maximum rated capacity of generators, GEN1 and GEN2, by averaging potential daily emissions over a 24-hour period, and by averaging potential annual emissions over 8,760 hours per year.

Two individual operating scenarios were modeled by St. Luke's Meridian to account for the existing permit condition which allows the facility to operate only one boiler at any time. One scenario included modeling air pollutant emissions from BLR1, GEN1, and GEN2, and the second scenario modeled emissions from BLR2, GEN1, and GEN2. Each scenario was modeled under identical firing rates and duration of operation.

DEQ verification modeling was conducted for both the original modeling demonstration and the revised modeling demonstration received on December 7, 2005. DEQ ran the operating scenario for the SO₂ 3-hour average with BLR2, GEN1, and GEN2, which was predicted to cause slightly greater ambient impacts than the operating scenario using BLR1, GEN1, and GEN2. DEQ's analyses confirmed the results presented by St. Luke's Meridian.

Table 7. RESULTS OF FULL IMPACT ANALYSES						
Pollutant	Averaging Period	Modeled Design Concentration (µg/m ³) ^d	Background Concentration (µg/m ³)	Total Ambient Impact (µg/m ³)	NAAQS ^b (µg/m ³)	Percent of NAAQS
SO ₂ ^d	3-hour	324.3(324.2)	120	444.3(444.2)	1,300	34.2
	24-hour	182.8	40	222.8	365	61.0
	Annual	11.9	10	21.9	80	27.4

^a Micrograms per cubic meter

^b National ambient air quality standards

^c Sulfur dioxide

^d Values in parentheses were obtained from DEQ verification modeling using ISCST3-Prime.

4.0 CONCLUSIONS

The ambient air impact analysis submitted, in combination with DEQ's verification analyses, demonstrated to DEQ's satisfaction that emissions from the facility, as represented by the applicant in the permit application, will not cause or significantly contribute to a violation of any air quality standard.

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